## 4.8.4 AG4 - EASTSIDE SAN JOAQUIN RIVER

The Eastside San Joaquin River Region encompasses the area from the San Joaquin River near Fresno north to the Cosumnes River, and from the eastern foothills to San Joaquin River as it travels up the valley to the Delta. This area is predominantly agricultural but includes the metropolitan areas of Stockton, Modesto, and Merced along with numerous other communities. Several rivers originating in the Sierra Nevada flow out of the mountains and west into the San Joaquin River (as it travels through the center of the valley). These include the Merced, Tuolumne, Stanislaus, and Mokelumne Rivers, as well as other small tributaries. Natural flows and excellent water quality have provided ample supplies to the agricultural users on the east side of the valley.

Losses associated with applied water typically recharge groundwater or return to surface waterways. Either way, they are available again for other beneficial uses. Irrecoverable losses are almost non-existent. However, some degradation of shallow groundwater does occur as a result of deep percolation of salts and trace elements—primarily in the southern portion of this region and at the bottom of the valley trough.

Many of the local water districts have firm water rights dating back to the turn of the century. Some water is imported into the region via the Madera Canal. This water is diverted from the San Joaquin River at Millerton Lake and routed north to irrigate lands in Madera County. Otherwise, there are no major out-of-basin deliveries of water (as occurs in export regions). Agricultural acreage is anticipated to decline slightly in this region as a result of increased urbanization.

**AGRICULTURAL INFORMATION**
**Eastside San Joaquin River Region**

| | |
|---|---|
| Types of crops grown: | Tomatoes, corn, sugar beets, some truck crops, trees, vines, alfalfa, and pasture. |
| Irrigated land: | Approximately 1,270,000 acres. |
| Types of irrigation systems in use: | Most of the area is under surface irrigation (furrow or border). Micro/drip systems are increasing in use for trees and vines. |
| Average applied water: | Approximately 4.04 MAF annually. |
| Source of water: | Groundwater, used for less than one-quarter of the water supply needs. An overdraft of approximately 200 TAF occurs annually, primarily in San Joaquin and Madera Counties.<br><br>Surface water primarily originates in the Sierra Nevada and is of high quality. It is used for the majority of irrigation needs.<br><br>Reuse of losses is an important feature in this area, with most losses either recharging the groundwater or returning to surface waterways. |

*Table 4-9a. Total Potential Reduction of Application (TAF)*

| USE | TOTAL EXISTING LOSS[2] | NO ACTION | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[2] |
|---|---|---|---|---|
| On farm | - | 363-393 | 273-294 | 636-687 |
| District | - | 73-78 | 54-59 | 127-137 |
| **Total** | **1,262** | **436-471** | **327-353** | **763-824** |

[1] See Table 4-2. Much of this loss is reused downstream for other beneficial uses, including in-stream flow.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-9b. Potential for Recovering Currently Irrecoverable Losses (TAF) (Subset of 4-9a)*

| USE | EXISTING IRRECOVERED LOSS[1] | NO ACTION | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[2] |
|---|---|---|---|---|
| On farm | - | 0-6 | 0-5 | 0-11 |
| District | - | 0-1 | 0-1 | 0-2 |
| **Total** | **104** | **0-7** | **0-6** | **0-13** |

[1] See Table 4-2. The difference between these values and the total irrecoverable saving results from water leaching, water lost to channel evaporation and consumption, and limits on irrigation and water delivery technology.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-9c. Recovered Losses with Potential for Rerouting Flows (TAF) (Subset of 4-9a)*

| USE | EXISTING RECOVERED LOSS | NO ACTION[1] | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[1] |
|---|---|---|---|---|
| On farm | - | 363-386 | 273-289 | 636-675 |
| District | - | 73-77 | 54-58 | 127-135 |
| **Total** | **1,158** | **436-463** | **327-347** | **763-810** |

[1] See regional table in Attachment A at the end of this document for derivation of values.

## 4.8.5 AG5 - TULARE LAKE

The Tulare Lake Region includes the southern San Joaquin Valley from the southern limit of the San Joaquin River watershed to the base of the Tehachapi Mountains. The area is predominantly agricultural, but many small agricultural communities as well as the rapidly growing cities of Fresno and Bakersfield are located here. The Kings, Kaweah, Tule, and Kern Rivers flow into this region from the east. All of the rivers terminate in the valley floor and do not drain to the ocean except in extremely wet years. This means there is also no outlet for drainage flows originating on farm. This area is considered a closed basin.

Because most of the source water is of very high quality, both surface and subsurface agricultural drainage is extensively reused, except along the western slope of the basin. In fact, **artificial recharge of groundwater basins, known as "groundwater banking,"** occurs in many areas of the Tulare Lake basin. This practice is likely to increase in future years as combined management of surface water and groundwater sources becomes more essential. On the western slope and in the southern end of the basin, significant quantities of water are imported from the Delta via the California Aqueduct. This water supplies areas like Westlands Water District and the member agencies of Kern County Water Agency.

Because of the closed-in nature of the basin (there is no drainage outlet except in very wet periods), salinity does buildup in the soils. As water is reused and natural salts present in the irrigation water are leached from the soil, the drainage water becomes increasingly salty. Several evaporation ponds have been constructed in portions of the basin to collect and evaporate this saltier drainwater. Drainage problems tend to occur only along the western slope of the basin and around the historic Tulare Lake bed. In these areas, the conservation of irrecoverable losses has some potential.

Irrigated agriculture accounts for about 95% of the water use in the region. In the future, increased urbanization and increasing costs for water could reduce the variety and acreage of crops being produced and, thus, the amount of agricultural water use (DWR 1994).

**AGRICULTURAL INFORMATION**
**Tulare Lake Region**

| | |
|---|---|
| Types of crops grown: | Cotton, tomatoes, trees, row crops, truck crops, and vines. Double cropping of some crops also occurs. |
| Irrigated land: | Approximately 3,200,000 acres. |
| Types of irrigation systems in use: | About 70% of the area is under surface irrigation (furrow). Drip/micro systems are more prevalent on trees and vines but also are being used more extensively on row and truck crops. |
| Average applied water: | Approximately 9.2 MAF annually. |
| Source of water: | Groundwater, including a 500-600 TAF annual overdraft.<br><br>Surface water from Kings, Kaweah, Tule, and Kern Rivers and imported supplies from the Friant-Kern system and the California Aqueduct.<br><br>Reuse of losses is an important feature in this area, with more than 75% of deep percolation being recovered and reused. |

## Tulare Lake Region

*Table 4-10a. Total Potential Reduction of Application (TAF)*

| USE | TOTAL EXISTING LOSS[1] | NO ACTION | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[2] |
|---|---|---|---|---|
| On farm | - | 443-497 | 332-373 | 775-870 |
| District | - | 265-298 | 199-223 | 464-521 |
| **Total** | **2,315** | **708-795** | **531-596** | **1,239-1,391** |

[1] See Table 4-2. Much of this loss is reused downstream for other beneficial uses, including in-stream flow.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-10b. Potential for Recovering Currently Irrecoverable Losses (TAF) (Subset of 4-10a)*

| USE | TOTAL IRRECOVERED LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[2] |
|---|---|---|---|---|
| On farm | - | 14-69 | 11-51 | 25-120 |
| District | - | 9-41 | 6-31 | 15-72 |
| **Total** | **602** | **23-110** | **17-82** | **40-192** |

[1] See Table 4-2. The difference between these values and the total irrecoverable saving results from water leaching, water lost to channel evaporation and consumption, and limits on irrigation and water delivery technology.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-10c. Recovered Losses with Potential for Rerouting Flows (TAF) (Subset of 4-10a)*

| USE | EXISTING RECOVERED LOSS | NO ACTION[1] | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[1] |
|---|---|---|---|---|
| On farm | - | 429 | 321 | 750 |
| District | - | 257 | 193 | 450 |
| **Total** | **1,713** | **685** | **514** | **1,199** |

[1] See regional table in Attachment A at the end of this document for derivation of values.

## 4.8.6 AG6 - SAN FRANCISCO BAY

The San Francisco Bay Region is primarily urban with very little agricultural acreage. A 1990 land use survey shows only about 60,000 acres of agriculture in the region (DWR 1994). This amount represents a 60% reduction in 40 years. Agriculture only uses about 1% of the entire region's net water demand (80% of net demand is for environmental flows). Agricultural production generally is located on the outskirts of the urban areas and in isolated valleys, such as the Napa, Sonoma, and Livermore Valleys. More than half of the agricultural acreage is for wine grapes. It is anticipated that a small portion of the existing irrigated land will be lost to urbanization. However, the ability to grow vines in areas never before irrigated will add new acreage and result in little or no net change.

Because of the location of most of the agriculture, losses associated with irrigation are recaptured through deep percolation or surface runoff to streams and waterways. The region does not have irrecoverable losses associated with irrigated agriculture (urban use is discussed in a separate section).

**AGRICULTURAL INFORMATION**
**San Francisco Bay Region**

| | |
|---|---|
| Types of crops grown: | Predominantly vineyards, with some truck crops and fruit trees. |
| Irrigated land: | Approximately 60,000 acres. |
| Types of irrigation systems in use: | Mostly pressurized systems using drip/micro or sprinklers. |
| Average applied water: | Approximately 97 TAF. |
| Source of water: | Groundwater is a key source for agriculture.<br><br>Surface water is generated locally as well as imported from various areas, including directly from the Sierra Nevada and from the Delta.<br><br>Reuse is an important feature in this area. Because losses typically recharge groundwater, no irrecoverable water is associated with agricultural use. |

*Table 4-11a. Total Potential Reduction of Application (TAF)*

| USE | TOTAL EXISTING LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 6-7 | 5-6 | 11-13 |
| District | - | 1-1 | 0 | 1-1 |
| **Total** | **23** | **7-8** | **5-6** | **12-14** |

[1] See Table 4-2. Much of this loss is reused downstream for other beneficial uses, including in-stream flow.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-11b. Potential for Recovering Currently Irrecoverable Losses (TAF) (Subset of 4-11a)*

| USE | TOTAL IRRECOVERED LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 2-4 | 2-3 | 4-7 |
| District | - | 0 | 0 | 0 |
| **Total** | 12 | 2-4 | 2-3 | 4-7 |

[1] See Table 4-2. The difference between these values and the total irrecoverable saving results from water leaching, water lost to channel evaporation and consumption, and limits on irrigation and water delivery technology.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-11c. Recovered Losses with Potential for Rerouting Flows (TAF) (Subset of 4-11a)*

| USE | EXISTING RECOVERED LOSS | NO ACTION[1] | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[1] |
|---|---|---|---|---|
| On farm | - | 4 | 3 | 7 |
| District | - | 0 | 0 | 0 |
| **Total** | **11** | **4** | **3** | **7** |

[1] See regional table in Attachment A at the end of this document for derivation of values.

## 4.8.7 AG7 - CENTRAL COAST

The Central Coast Region encompasses land on the western side of the coastal mountains that is hydraulically connected to the Bay-Delta region. This includes southern portions of the Santa Clara Valley and San Benito County. Most of the agricultural water supplies are generated within the region. However, about 50 TAF of Delta waters are exported annually to this region through the San Felipe Unit of the CVP. Exported water is delivered both to agricultural and urban users in San Benito and Santa Clara Counties. The San Benito River also provides surface water to agriculture in the area. The San Benito River joins with the Pajaro River and flows through the agricultural areas around Watsonville and then on to the ocean.

Some of the coastal area around Watsonville is experiencing sea water intrusion as a result of groundwater overdraft. To combat this, a proposed extension of the San Felipe pipeline may bring additional Delta waters to the Watsonville area.

Agricultural acreage in the upslope portions of the Santa Clara Valley and around Watsonville is anticipated to decline slightly in the future as a result of increased urbanization and increasingly high water costs.

**AGRICULTURAL INFORMATION**
**Central Coast Region**

| | |
|---|---|
| Types of crops grown: | Truck crops, strawberries, artichokes, fruit trees, and vines. |
| Irrigated land: | Approximately 100,000 acres. |
| Types of irrigation systems in use: | Mostly pressurized systems using drip/micro or sprinklers. Some furrow irrigation still occurs. |
| Average applied water: | Approximately 48 TAF annually. |
| Source of water: | Groundwater is a main source of water for many truck crop fields, except in areas experiencing sea water intrusion. Overdraft conditions exist in some areas of the region.<br><br>Imported water delivered from the San Felipe Unit. Other surface water originates in the San Benito River.<br><br>Reuse is an important feature in this area. Losses typically recharge groundwater, but in some coastal areas, deep percolation is "lost" to degraded groundwater. |

## Central Coast Region

*Table 4-12a. Total Potential Reduction of Application (TAF)*

| USE | TOTAL EXISTING LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 3-4 | 2-3 | 5-7 |
| District | - | 0 | 0 | 0 |
| **Total** | **10** | **3-4** | **2-3** | **5-7** |

[1] See Table 4-2. Much of this loss is reused downstream for other beneficial uses, including in-stream flow.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-12b. Potential for Recovering Currently Irrecoverable Losses (TAF) (Subset of 4-12a)*

| USE | TOTAL IRRECOVERED LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 0 | 0 | 0 |
| District | - | 0 | 0 | 0 |
| **Total** | **1** | **0** | **0** | **0** |

[1] See Table 4-2. The difference between these values and the total irrecoverable saving results from water leaching, water lost to channel evaporation and consumption, and limits on irrigation and water delivery technology.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-12c. Recovered Losses with Potential for Rerouting Flows (TAF) (Subset of 4-12a)*

| USE | EXISTING RECOVERED LOSS | NO ACTION[1] | INCREMENTAL CALFED SAVINGS[1] | TOTAL POTENTIAL[1] |
|---|---|---|---|---|
| On farm | - | 3-4 | 2-3 | 5-7 |
| District | - | 0 | 0 | 0 |
| **Total** | **9** | **3-4** | **2-3** | **5-7** |

[1] See regional table in Attachment A at the end of this document for derivation of values.

## 4.8.8 AG8 - SOUTH COAST

The South Coast Region lies south of the Tehachapi Mountains and extends to the California border with Mexico. It is home for more than 50% of the state's population but only 7% of the state's total land area. Rivers and streams that originate in this region flow toward the Pacific Ocean. The climate is Mediterranean-like, with warm and dry summers followed by mild and wet winters. Of the region's 11,000-square-mile area, only around 300,000 acres currently are used for irrigated agriculture. The agricultural net water demand accounts for only about 15% of total net water demand in the region. It is projected that the region will increase from a 1990 population of 16 million to over 25 million by 2020. Urbanization of agricultural land is expected to be most pronounced in this region. It is projected that by 2020 irrigated crop acreage will decline to about 184,000 acres, a 42% reduction (DWR 1994). Some areas in the region may experience even greater reduction with more than two-thirds of the irrigated land going out of production. Reductions in irrigated land, coupled with existing high levels of efficiency, will result in little water savings potential through increased efficiency.

**AGRICULTURAL INFORMATION**
**South Coast Region**

| | |
|---|---|
| Types of crops grown: | Primarily citrus, olives, and avocados (over 50% of the irrigated land). Vineyards, nursery products, and row crops make up another 40%. |
| Irrigated land: | Approximately 300,000 acres. |
| Types of irrigation systems in use: | Pressurized systems such as sprinklers, micro-sprays, and drip are widely used for the permanent tree and vine crops. Water delivery systems are mainly pipeline and, in some cases, extensions of municipal systems. |
| Average applied water: | Approximately 755 TAF annually. |
| Source of water: | Groundwater, supplying about a third of the total demand.<br><br>Imported water delivered from the Colorado River and from the SWP; limited local surface supplies are also available.<br><br>Reuse; the region is greatly increasing its recycling programs, some of which look to deliver treated urban wastewater to agricultural areas. |

*Table 4-13a. Total Potential Reduction of Application (TAF)*

| USE | TOTAL EXISTING LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 39-47 | 30-35 | 69-82 |
| District | - | 16-19 | 12-15 | 28-34 |
| **Total** | **213** | **56-67** | **42-50** | **97-117** |

[1] See Table 4-2. Much of this loss is reused downstream for other beneficial uses, including in-stream flow.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-13b. Potential for Recovering Currently Irrecoverable Losses (TAF) (Subset of 4-13a)*

| USE | TOTAL IRRECOVERED LOSS2 | NO ACTION | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL2 |
|---|---|---|---|---|
| On farm | - | 14-22 | 10-16 | 24-38 |
| District | - | 6-9 | 4-7 | 10-16 |
| **Total** | **123** | **20-31** | **15-23** | **34-54** |

[1] See Table 4-2. The difference between these values and the total irrecoverable saving results from water leaching, water lost to channel evaporation and consumption, and limits on irrigation and water delivery technology.

[2] See regional table in Attachment A at the end of this document for derivation of values.

*Table 4-13c. Recovered Losses with Potential for Rerouting Flows (TAF) (Subset of 4-13a)*

| USE | EXISTING RECOVERED LOSS | NO ACTION1 | INCREMENTAL CALFED SAVINGS1 | TOTAL POTENTIAL1 |
|---|---|---|---|---|
| On farm | - | 26 | 19 | 45 |
| District | - | 10 | 8 | 18 |
| **Total** | **90** | **36** | **27** | **63** |

[1] See regional table in Attachment A at the end of this document for derivation of values.